

SECTION 0215

CONSTRUCTION SURVEYING AND LAYOUT

0215.0100 GENERAL

0215.0101 Description of Work. The work under this Section shall consist of furnishing all materials, personnel, and equipment necessary to perform all surveying, staking, and verification of the accuracy of all existing control points noted on the plans. Included in this work shall be all calculations required for the satisfactory completion of the project in conformance with the plans and these specifications. The work shall be performed by a Registered Land Surveyor employed by the Contractor. All right-of-way monuments and lines shall be established by a Registered Land Surveyor employed by the Contractor.

The surveyor employed by the Contractor shall verify the accuracy of the control points established by the plans and shall set all stakes, including, but not necessarily limited to:

- Centerline stakes
- Offset stakes
- Reference point stakes
- Slope stakes
- Pavement lines
- Curb lines
- Grade stakes
- Stakes for sewer crossings, pipe, clearing, guard rail, fence, right-of-way markers, and survey monuments
- Blue tops for subgrade, subbase, and base courses
- Supplemental bench marks and permanent as-built elevation marks
- All other horizontal or vertical controls necessary for complete and accurate layout and construction of the work

The Contractor shall perform all layout work and set all control points, stakes, and references necessary for carrying out construction unless otherwise stated. The Owner is not responsible for the survey/layout.

The Contractor shall not employ or engage the services of any person or persons in the Agency's employ for the performance of any of the work as described herein.

0215.0300 EXECUTION

0215.0301 Construction Requirements. Prior to beginning construction, the Contractor shall submit to the Engineer for approval all layout/grade data on the Owner's standard layout forms, TW Standard Detail 105. The layout forms shall indicate the project name, Tucson Water plan number, and stationing and cut information for all valves, connections, hydrants, services, fittings, etc. to be incorporated into the system. All cuts shall be to pipe invert. Stationing shall

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be in accordance with the project plans. The layout form shall be filled out completely and sealed by a Land Surveyor registered in the State of Arizona. Every set of layout/cut sheet forms submitted must be appropriately sealed. The Notice to Proceed will not be issued until the Inspector verifies that the layout is complete and matches the layout/cut sheets.

The Contractor shall verify the accuracy of the control points established by the plans and shall set all stakes including, but not necessarily limited to:

- Centerline stakes
- Offset stakes
- Reference point stakes
- Slope stakes
- Pavement lines
- Curb lines
- Grade stakes
- Stakes for sewer crossings, pipe, clearing, guard rail, fence, right-of-way markers, and survey monuments
- Blue tops for subgrade, subbase, and base courses
- Supplemental bench marks and permanent as-built elevation marks
- All other horizontal or vertical controls necessary for complete and accurate layout and construction of the work

If errors are discovered during the verification process, and control points do not agree with the geometrics shown in the plans, the Contractor shall promptly notify the Engineer in writing and explain the problem in detail. The Engineer will advise the Contractor within 5 working days of any corrective actions that may be deemed necessary.

The surveyor employed by the Contractor shall be responsible for the proper layout and accuracy of all property markers and section monuments required by the project plans.

The Contractor's layout shall comply with the following requirements:

- (1) All projects will be stationed at a minimum of 50-foot intervals.
- (2) Curves with a radius of 300 feet or less shall be stationed every 25 feet; curves with a radius greater than 300 feet shall be stationed at least every 50 feet. All tangent sections shall be stationed at intervals not exceeding 50 feet.
- (3) Cut information for the end location of services, fire hydrants, and stub-outs shall be provided. Cut information shall be indicated to the top of curb or—where no curb exists—to the finish grade. All cuts for the pipe line will be to pipe invert. Stationing and cut information shall be provided at both the main and end location for fire

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hydrants, stub-outs, and ARVs, while services shall require this information only at their end locations.

- (4) Layout/cut sheets shall indicate any unusual conditions (i.e., additional cut, extra cover, drainages, etc.).
- (5) Construction staking shall clearly and accurately reflect the information on the layout forms. Grade stakes shall contain legible station, offset, and cut data.
- (6) Offset hubs shall be located so as to avoid disturbance during construction.
- (7) Water mains shall be installed with a minimum 44 inches of cover from finish grade except as noted on the plans. Water mains shall never have less than 36 inches of cover during construction (see TW Standard Detail 105).
- (8) Water mains installed within existing Pima County rights-of-way that are not at final finished grade shall be installed with a minimum 60 inches of cover.

The Contractor shall exercise care in the preservation of stakes, references, and bench marks, and shall reset them at no additional cost to the Agency when any are damaged, lost, displaced, or removed. The Contractor—at his/her expense—shall replace “in kind” any existing survey monumentation damaged or disturbed during construction, including property pins. This replacement shall be made by an Arizona Registered Land Surveyor and will require a Record of Survey to be filed with the Pima County Recorder’s Office.

Any discrepancies in grade, alignment, earthwork quantities, locations, or dimensions detected by the Contractor shall immediately be brought to the Engineer’s attention. No changes in the project plans will be allowed without the Engineer’s approval.

The Owner reserves the right to make inspections and random checks of any portion of the staking and layout work. If, in the Engineer’s opinion, the work is not being performed in a manner that will assure proper controls and accuracy, the Engineer will order any or all of the staking and layout work redone at the sole cost of the Contractor and at no additional cost to the Agency.

If any portion of the Contractor’s staking and layout work is ordered redone, resulting in additional rechecking by the Engineer, the Owner shall be reimbursed for all costs of such additional checking. The amount of such costs will be deducted from the Contractor’s monthly estimate. Layout/cut sheets shall be submitted for the Engineer’s approval. Layout must be verified by the Engineer prior to issuance of the Notice to Proceed.

Inspection of the Contractor’s layout by the Engineer and the acceptance of all or any part of it shall not relieve the Contractor of his/her responsibility to secure the proper dimensions, grades, and elevations of the several parts of the work.